

**STATUS OF THE PIPING PLOVER IN MASSACHUSETTS:  
1997 SUMMARY REPORT**

**Prepared by:**

**Scott M. Melvin  
Massachusetts Division of Fisheries and Wildlife  
Natural Heritage and Endangered Species Program -  
Rte. 135, Westborough, MA 01581**

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Observers reported a total of 483 breeding pairs of Piping Plovers (Charadrius melodus) at 97 sites in Massachusetts in 1997 (Table 1). An additional 30 sites were monitored one or more times during May or June, but no breeding pairs were detected. Breeding pairs are defined as pairs observed with either a nest or unfledged chicks or that exhibit site tenacity and evidence of pair bonding and territoriality for at least 2 weeks. Overall observer effort in 1997, measured as number of sites surveyed and intensity of census effort at each site, was roughly comparable to previous efforts conducted annually since 1986.

At least 10 pairs that established territories or nested unsuccessfully were believed to have moved to new sites and renested, or at least established new territories at new sites, between mid-May and mid-June. These pairs were included in counts of pairs at both sites where they occurred, but were tallied only once in regional and state totals for numbers of pairs and numbers of pairs for which fledging data were reported (Table 1).

The 1997 total of 483 pairs is the highest count of Piping Plovers recorded in Massachusetts since comprehensive statewide surveys began in 1986, and is an increase of 29 pairs (6%) over the 1996 count of 454 pairs (Table 2). Numbers of pairs increased in 5 regions of the state and declined in 4 (Table 3).

In addition to estimating total pairs present during the breeding season, cooperators also censused pairs at all occupied sites and 29 historic or potential sites during the standardized 1997 Atlantic Coast "index count" from 31 May to 8 June. The objective of the index count is to minimize double-counting of pairs that move between sites, thereby providing an index to population trends that may be more precise than the total count. The 1997 index count was 457 pairs (Table 1), 95% of the total count of 483 pairs and a 4.6% increase over the 1996 index count of 437 pairs.

Maximum numbers of breeding pairs in the state were reported from South Beach-Chatham (35), Sandy Neck (33), Crane Beach (27), and Monomoy National Wildlife Refuge-South Island (25). Seventeen sites reported  $\geq 10$  pairs; together they accounted for 58% of all pairs.

Overall mean productivity for Massachusetts in 1997 was 1.33 chicks fledged per pair based on data from 468 of 483 pairs (97%) at 89 of 97 (92%) nesting beaches (Table 2). This is the lowest productivity since 1988 and is the fifth year in a row that statewide productivity has declined. Only 2 regions

of the state (North Shore and South Shore) averaged  $> 1.5$  chicks fledged/pair, while 3 regions (Elizabeth Islands, Martha's Vineyard and Nantucket) averaged  $< 1.0$  chick fledged/pair (Table 3). A chick was considered fledged if it survived  $\geq 25$  days or was observed in flight, whichever occurred first.

Based on reports from cooperators statewide, observed nest success was 0.55 (334 of 606 nests hatched  $\geq 1$  egg). For 594 nests for which complete data were reported, observed hatching success was 0.53 (1,149 of 2,150 eggs hatched) and fledging success was 0.53 (607 of 1,149 chicks survived to fledge).

In 1997, inclement weather had the greatest negative impact on Piping Plover productivity that we have observed since 1986 when intensive statewide monitoring began. The most important cause of nest loss in 1997 was flooding and overwash from high tides and heavy rains (Table 4). Seventy nests were lost to flooding, more than twice the total of 32 reported in 1996. The majority of nest losses to overwash in 1997 occurred as a result of high tides associated with strong sustained northeast winds from an offshore storm June 4-6. Then in late July, 12 observers reported that a total of 79 unfledged chicks disappeared from 20 beaches during a sustained period of strong winds, heavy rain, and storm surge associated with the offshore passage of Hurricane Danny, July 24-26. This unprecedented loss of chicks during a single weather event represented nearly 7% of the 1,149 chicks hatched in Massachusetts in 1997, and included many relatively old chicks that otherwise would likely have fledged. Beaches where unfledged chicks were believed lost to the effects of Danny were widely distributed along the coast, including on the North Shore (1), South Shore (3), Upper Cape (1), Lower Cape (7), Bristol County (1), Martha's Vineyard (4), and Nantucket (3).

Abandonment was the second most commonly identified cause of nest loss in 1997, followed by predation by crows, unknown predators, and foxes (Table 4). Wire predator exclosures were used to protect 342 of 606 nests (56%). Nearly 13% of nests in exclosures were abandoned (43 of 342 nests) compared to 6% of nests without exclosures (15 of 264). This was a slight improvement over the 15% abandonment rate for exclosed nests observed in 1996. Causes of abandonment were unknown in 40 of 58 (69%) instances (Table 5). The most commonly identified causes of nest abandonment were harassment by potential predators or competitors ( $n = 9$  nests) and depredation of one of the adults ( $n = 3$ ).

Observed nest success (percentage of nests hatching  $\geq 1$  egg) was 78% for nests protected with exclosures compared to 41% for nests without exclosures (Table 6). Similarly, 73% of eggs protected with exclosures hatched compared to 42% of unprotected eggs (Table 7).

Aside from the 79 chicks that disappeared during the off-shore passage of Hurricane Danny, few causes of chick mortality were directly observed or could be confidently surmised. Three unfledged chicks were found crushed in off-road vehicle tracks: 2 in a vehicle trail behind Nauset Beach in Orleans, and 1 on Squibnocket Beach on Martha's Vineyard. One unfledged chick was found crushed in a human footprint on Crane Beach in Ipswich, and a second chick was suspected to have been stepped on and killed at Plymouth Beach. Another chick was believed to have been pecked to death by an adult plover on Plymouth Beach. At Smith Point on Nantucket, fishermen were reported to have observed a gull taking a chick, and monitors there suspected gulls or crows took other chicks. Monitors also reported concerns about possible chick mortality caused by beach-raking activities at Merkel Beach in Yarmouthport and Scusset Beach in Bourne.

Finally, 3 adult plovers were found dead at 3 different locations: Race Point-South Beach, Barney's Joy-Little Beach, and East Beach on Chappaquiddick. All 3 birds appeared to have been killed by unidentified predators, and all had nests inside predator exclosures at the time of death.

We extend our sincere thanks to all the biologists, seasonal staff, beach managers, landowners, and volunteers that participated in conservation efforts on behalf of Piping Plovers and other coastal waterbirds in Massachusetts in 1997.

Table 1. Abundance, distribution, and productivity of Piping Plovers in Massachusetts, 1997.

Location	Number of pairs		No. chicks fledged <sup>c</sup>	No. pairs for which fledge data reported	Source <sup>d</sup>
	Index count <sup>a</sup>	Total count <sup>b</sup>			
<b>NORTH SHORE</b>					
Salisbury Beach, Salisbury	1	1	3	1	MMa
Plum Island-North End, Newburyport/Newbury	2	1	0	1	DM
Parker River NWR, Newbury/Rowley	17	16	20	16	DM
Sandy Point State Res., Ipswich	2	2	0	2	DM
Crane Beach, Ipswich	24	27 <sup>c</sup>	59	27 <sup>c</sup>	DR
Coffin's Beach, Gloucester	1	1	4	1	DR
Wingaersheek Beach, Gloucester	0	nd <sup>f</sup>	nd	-	DR
Good Harbor Beach, Gloucester	0	nd	nd	-	DR
<b>SOUTH SHORE</b>					
Third Cliff, Scituate	2	2	3	2	CW, SH
Fourth Cliff, Scituate	0	0	0	0	CW, SH
Duxbury Beach, Duxbury/Plymouth <sup>g</sup>	12	12	28	12	CW, RC, SH
Plymouth Beach, Plymouth	9	10	13	10	CW, JC, SH, AB, TD
Ellisville State Park, Plymouth	1	1	2	1	MZ
Sagamore Beach, Bourne and Sandwich	5	5	5	5	MZ
Scusset Beach State Res., Sandwich	1	1	2	1	MZ
<b>UPPER CAPE</b>					
Black Beach/Sippewisset, W. Falmouth	0	0	0	0	CG, LG
Woodneck Beach, W. Falmouth	0	0	0	0	CG, LG
Washburn Island, Falmouth	2	2	4	2	CB
South Cape Beach, Mashpee	4	5	5	5	CB
New Seabury, Mashpee	1	1	3	1	CB
Popponesset Spit, Mashpee	4	4	8	4	CG, LG

Table 1. Continued.

Location	<u>Number of pairs</u>		No. chicks fledged	No. pairs for which fledge data reported	Source
	Index count	Total count			
193 Town Neck Beach, Sandwich	1	1	2	1	SK, LG
14 Springhill Beach, Sandwich	8	8	17	8	SK, LG
15 East Sandwich Beach, Sandwich	nd	nd	nd	nd	-
16 Scorton Creek, Sandwich	5	6	7	6	MG, ES
17 Sandy Neck, Barnstable	33	33	29	33	MG, ES
18 Sampson's Is.-Dead Neck, Barnstable	4	4	8	4	BL, AS, KB, LG
19 Dowse's Beach, Osterville	0	nd	nd	nd	BL
20 Long Beach, Centerville	3	3	5	3	DA, SC, LG
21 Squaw Island, Hyannisport	2	2	4	2	DA, SC, LG
22 Kalmus Park Beach, Hyannis	2	2	4	2	DA, SC, LG
23 Gray's Beach, Yarmouth	6	6	12	6	KF, LG
24 Seagull Beach/Radio City, Yarmouth	3	3	10 <sup>h</sup>	3	CT, LW, LG
25 Great Island, Yarmouth	7	7	11	7	CT, LW, LG
26 West Dennis Beach, Dennis	1	1	1	1	LM, KH, LG
27 Chapin Beach, Dennis	2	2	5	2	KF, LMo, KH, LG
28 Mayflower Beach, Dennis	0	nd	nd	nd	KF, LMo, KH, LG
29 Town Landings, Dennis	0	nd	nd	nd	LG
30 Corporation Beach, Dennis	0 <sup>i</sup>	0 <sup>i</sup>	0	0	LG
31 Sesuit Beach, Dennis	0	nd	nd	nd	LM, KH, KF
32 Quivett Neck/Coles Pond, Dennis	0 <sup>j</sup>	1	1	1	GD, LG
33 Wings Island, Brewster	0	nd	nd	nd	LM, KH, KF, LG
34 Robbins Hill Beach, Brewster	0	nd	nd	nd	LG
35 Town Beach, Brewster	0	nd	nd	nd	LG
36 Ellis Launching Beach, Brewster	0	nd	nd	nd	LG
37 Merkel Beach, Harwichport	0	1	1	1	LG, BM
<b>LOWER CAPE</b>					
927 Forest Beach, Chatham	nd	nd	nd	nd	-

Table 1. Continued.

Location	<u>Number of pairs</u>		No. chicks fledged	No. pairs for which fledge data reported	Source
	Index count	Total count.			
31 Cockle Cove, Chatham	nd	nd	nd	nd	-
40 Harding Beach, Chatham	1	1	3	1	GD, JH, LS, LG
41 Harding Beach Point, Chatham	nd	nd	nd	nd	-
42 North Monomoy Island, Chatham	1	1	2	1	JM, SW, WE
43 South Monomoy Island, Chatham	22	25	44	25	JM, SW, WE
44 South Beach, Chatham	27	35	31	35	JH, LS
45 Tern Island, Chatham	3	3	5	3	BP, LG
46 Nauset Beach, Chatham	10	10	8	10	KC, NT
47 Nauset Beach, Orleans	9 <sup>k</sup>	10 <sup>k</sup>	6	10 <sup>k</sup>	KC, NT
48 Nauset Spit (Heights), Orleans	16	16	5	16	KC, NT
49 New Island, Orleans	0	0	0	0	KJ
50 Skaket Beach, Orleans	0	nd	nd	nd	LG
51 Rock Harbor Beach, Orleans	0	nd	nd	nd	LG
52 Rock Creek (north side), Orleans	0	nd	nd	nd	LG
53 First Encounter Beach, Eastham	0	nd	nd	nd	LG
54 Coast Guard Beach, Eastham <sup>1</sup>	12	14	23	14	NK, EH
55 Marconi Beach, Wellfleet <sup>m</sup>	10	10	10	10	NK, EH
56 Sunken Meadow Spit, Wellfleet	1	1	3	1	LG, SM
57 Lieutenant's Island, Wellfleet	1	1	0	1	LG
58 Indian Neck, Wellfleet	nd	nd	nd	-	-
59 Jeremy Point/Great Island, Wellfleet	7	7	10	7	NK, EH
60 Pamet Harbor-South, Truro <sup>a</sup>	nd	nd	nd	nd	-
61 Pamet Harbor-North/ Corn Hill Beach, Truro	1	1	4	1	GD, LG
62 Pond Village Beach, Truro	nd	nd	nd	nd	-
63 Pilgrim Beach/Beach Point, Truro	1	1	2	1	GD, LG
64 Ballston Beach/Newcomb Hollow, Truro	5	6	9	6	EH

Table 1. Continued

Location	<u>Number of pairs</u>		No. chicks fledged	No. pairs for which fledge data reported	Source
	Index count	Total count			
Longnook Beach, Truro	1	1	1	1	EH
High Head/Head of the Meadow, Truro	7	7	9	7	EH
Race Point-South Beach, Provincetown/Truro <sup>o</sup>	14	15 <sup>P</sup>	26	15 <sup>P</sup>	EH
Race Point-North Beach, Provincetown	5	5 <sup>P</sup>	4	5 <sup>P</sup>	EH
Long Point/Wood End, Provincetown	5	5	12	5	EH
<b>BRISTOL COUNTY</b>					
Stony Point Dike, Wareham	nd	nd	nd	nd	-
Long Beach Point, Wareham	nd	nd	nd	nd	-
Little Harbor Beach, Wareham	nd	nd	nd	nd	-
West Island, Fairhaven	3	3	6	3	JHi, RH, ASC
Winsegansett Heights, Fairhaven	0	0	0	0	RH
Round Hill Beach, Dartmouth	0	0	0	0	ASC, JHi
Salter's Pond, Dartmouth	2	2	3	2	JHi, RH, ASC
Demarest-Lloyd State Park, Dartmouth	1	1	0	1	JHi, RH, ASC
Little Beach/Barney's Joy, Dartmouth	14	14	6	14	RH, JHi
Gooseberry Neck, Westport	0	0	0	0	ASC, JHi
Horseneck Beach, Westport	12	13	30	13	ASC, JHi
Acoaxet, Westport	1	1	4	1	ASC, JHi
Cockeast Pond, Westport	1	1	0	1	ASC, JHi
Richmond Pond, Westport	1	2 <sup>q</sup>	4	2 <sup>q</sup>	JHi, RH, RG, GV
Bay Point, Swansea	0	0	0	0	AW

Table 1. Continued.

Location	<u>Number of pairs</u>		No. chicks fledged	No. pairs for which fledge data reported	Source
	Index count	Total count			
<b>ELIZABETH ISLANDS</b>					
Naushon Island <sup>r</sup>	1	1	nd	0	JHa
Pasque Island-Robinson's Hole	nd	0	nd	0	JHa
Pasque Island-Cobbly	1	1	nd	0	JHa
Pasque Island-Quicks Hole	3	3	nd	0	JHa
Nashawena Island - Quick's Hole	5	5	0	5	CE
Nashawena Island - Canapitsit	1	1	nd	0	CE, JHa
Cuttyhunk Island	3	3	nd	0	SM
Penikese Island	0	0	0	0	BB, JL
<b>Martha's Vineyard</b>					
Harthaven, Oak Bluffs	2	2	0	2	DS
Sylvia State Beach, Edgartown	2	3	4	3	DS
Cow Bay, Edgartown	nd	nd	nd	nd	-
Eel Pond/Little Beach, Edgartown	2	2	2	2	DS
Lighthouse Beach, Edgartown	1	1	1	1	DS
Chappaquiddick Beach, Chappaquiddick	0	0	0	0	DS
Cape Pogue Elbow/The Narrows, Chappaquiddick	5	5	0	5	TSw, SL, LR, MM
Arruda's Pt./The Jetties, Chappaquiddick	1	1	1	1	TSw, SL, LR, MM
Leland/East Beaches, Chappaquiddick	2	2	0	2	TSw, SL, LR, MM
Wasque, Chappaquiddick	0	0	0	0	TSw, SL, LR, MM
Norton Point Beach, Edgartown	12	12	6	12	KCo, SS, LG
South Beach, Edgartown	0	nd	nd	nd	DS
Edgartown Great Pond, Edgartown <sup>r</sup>	2	5 <sup>t</sup>	4	3	DS
Oyster and Watcha Ponds, Edgartown and W. Tisbury	2	2	0	1	DS

Table 1. Continued.

Location	Number of pairs		No. chicks fledged	No. pairs for which fledge data reported	Source
	Index count	Total count			
007 Tisbury Great Pond/Black Point Pond, Chilmark <sup>u</sup>	10	10	8	10	JW, CE, DS
008 Chilmark Pond, Chilmark <sup>v</sup>	1	1	3	1	JW
009 Long Beach/Squibnocket Beach, Chilmark	4	4	7	4	LT
010 Moshup Trail Beach, Gay Head	1	1	3	1	LT, JW
011 Dogfish Bar, Gay Head	3	3	4	3	LT
012 Lobsterville Beach, Gay Head	1	1	3	1	LT, JW
013 Cedar Tree Neck/Lambert's Cove, West Tisbury	0	nd	nd	nd	DS
014 Tashmoo, West Tisbury	1	1	2	1	DS
015 Wilfred's Pd. and Mink Meadows Beach, Vineyard Haven	1	1	1	1	DS
016 Nomans Land	nd	nd	nd	nd	-
<b>Nantucket</b>					
017 Great Point/The Galls/ Coskata-West Beach <sup>w</sup>	4	6 <sup>x</sup>	1	6 <sup>x</sup>	JJ
018 Coskata-Inner Trail <sup>y</sup>	0	0	-	-	JJ
019 Coatue	1	2 <sup>x</sup>	4	2 <sup>x</sup>	KCB
020 Coskata-East Beach <sup>y</sup>	2	2	0	2	JJ
021 Coskata Inlet/The Haulover <sup>y</sup>	1	1	4	1	JJ, KCB
022 Wauwinet	2	2	0	2	SP
023 Squam Pond	1	1	0	1	KCB
024 Quidnet/Sesachacha Pond	nd	nd	nd	nd	-
025 Low Beach/Tom Nevers <sup>z</sup>	6	8	9	8	TS, LM
026 Surfside	nd	nd	nd	nd	-
027 Hummock Pond	1	1	1	1	KCB

Table 1. Continued.

Location	<u>Number of pairs</u>		No. chicks fledged	No. pairs for which fledge data reported	Source
	Index count	Total count			
128 Smith Point	5	5 <sup>aa</sup>	0	5 <sup>aa</sup>	TS, VT
29 Eel Point	3	5 <sup>aa</sup>	4	5 <sup>aa</sup>	KCB
30 Dionis Beach	1	1 <sup>aa</sup>	3	1 <sup>aa</sup>	TS, SP
31 Tuckernuck Island	4	4	nd	nd	TC, LM, GG
132 Muskeget Island	1 <sup>bb</sup>	1 <sup>bb</sup>	nd	nd	VT, GH, TS
<b>TOTALS</b>	<u>457</u>	<u>483</u>	<u>621</u>	<u>468</u>	

<sup>a</sup> Index count = number of territorial pairs counted between 30 May and 7 June 1997, the standardized index count period for the Atlantic Coast population.

<sup>b</sup> Total count = total number of territorial pairs present during all or a portion of the breeding season. Pairs that are suspected of nesting at more than 1 site are only tallied once in regional and state totals and total numbers of pairs for which fledging data were reported.

<sup>c</sup> Chicks fledged are defined as chicks  $\geq$  25 days of age or observed in flight, whichever occurs first.

<sup>d</sup> Key to sources: AB = Amy Bourque, AS = Audrey Schmidt, ASc = Amy Schulte, AW = Anthony Waring, BB = Brad Blodget, BL = Brian Long, BM = Betty-Anne McGrath, BP = Betty Pistel, CB = Chris Buelow, CE = Chris Egan, CG = Correne George, CT = Cherie Titerence, CW = Candace Williams, DA = Deniz Aygen, DM = Deborah Melvin, DR = David Rimmer, DS = Debra Swanson, EH = Ed Hoopes, ES = Eric Strauss, KF = Kristin Foresto, GD = Gena Dwyer, GG = Gerry Goode, GH = Gretchen Hull, GV = Griff Venator, JC = John Crane, JH = John Hanlon, JHa = Jeremy Hatch, JHi = John Hill, JJ = Jonathan Jendrzewski, JL = Jean Livingston, JM = Jennifer Megyesi, JW = Jennifer Weiland, KB = Katie Barzun, KC = Kerry

Collier, KCo = Kate Conde, KCB = Karen Combs-Beattie, KH = Kerri Hoey, KJ = Kyle Jones, LG = Laura Gill, LM = Larry Miller, LMo = Lindsey Morrill, LR = Lloyd Raleigh, LS = Lisa Strock, LT = Leah Tofte-Dorr, LW = Liz Weaver, MG = Melinda Gutman, MM = Mary Merges, MMA = Mike Magnifico, MZ = Margo Zdravkovic, NK = Nora Kenneway, NT = Neil Talancy, RC = Ryan Chandler, RG = Randy Groves, RH = Ruth Hefty, SC = Savannah Cutter, SH = Scott Hecker, SK = Shannon Keane, SL = Samantha Look, SM = Scott Melvin, SP = Swede Plaut, SS = Sally Slavinski, SW = Sharon Ware, TC = Tom Chase, TD = Theresa Douglas, TS = Tracy Sundell, TSw = Thomas Swenarton, VT = Vincent Todd, WE = Wendy Edwards.

<sup>c</sup> We suspect that Crane Beach pair no. 27 that completed its clutch on June 19 was one of the pairs that lost their nests to overwash on Plum Island on June 5. This pair is included in the Crane Beach tallies for total pairs and pairs with productivity data, but not in regional or state totals.

<sup>f</sup> nd = no data available.

<sup>g</sup> In this report, Duxbury Beach includes all of Duxbury Beach in Duxbury, as well as Gurnet and Saquish in Plymouth.

<sup>h</sup> One of 10 chicks that fledged at Seagull Beach died of severe trauma at 39 days of age. Massachusetts Audubon Society staff reported that they believed the chick had been stepped on by a pedestrian, although evidence was inconclusive.

<sup>i</sup> Plover tracks and 3 fresh scrapes were seen on Corporation Beach on June 3 and a single adult was seen on and off over the next 2 weeks. However, no pair was ever observed and no nest was found.

<sup>j</sup> A single bird was observed during the Index Count period on June 3 or 4, but was not seen again on June 9 and 10.

<sup>k</sup> We assume that Nauset-Orleans pair no. 6 that lost its nest on May 30 likely re-nested at some other location. This pair is included in index and total counts and number of pairs with fledge data for Nauset-Orleans, but not in regional or state totals.

<sup>l</sup> Coast Guard Beach now includes what for several years was referred to as "Plover Island" and later "Plover Spit". Plover Spit has now completely connected onto, and is indistinguishable from, the southern end of Coast Guard Beach in Eastham.

<sup>m</sup> For purposes of this compilation, Marconi Beach includes LeCount Hollow.

<sup>n</sup> Pamet Harbor-South is the beach at the south entrance to Pamet Harbor.

- <sup>o</sup> Race Point-South Beach includes all the Atlantic Ocean-facing beaches of Cape Cod National Seashore from High Head north to the beginning of Race Point Beach proper, including locations referenced in previous years as Mission Bell, Frenchie's, Exit 9, and Armstrong Cut.
- <sup>p</sup> Tallies for total count and pairs with fledge data include 2 pairs believed to have moved from Race Point-North to Race Point-South. These 2 pairs are tallied in totals for both sites, but only once in regional and state totals.
- <sup>q</sup> We assume that Richmond Pond pair # 1 that lost its nest on May 26 subsequently moved to another site and renested. This pair is tallied in totals for Richmond Pond, but not in regional or state totals.
- <sup>r</sup> All likely plover nesting beaches on Naushon Island were reported to have been surveyed, as well as Uncatena and Nonamesset islands.
- <sup>s</sup> The Edgartown-Great Pond site includes the beach in front of Crackatuxet Pond.
- <sup>t</sup> We assume that 2 of 5 pairs reported for Edgartown Great Pond nested elsewhere along the South Shore; only 3 of these pairs are tallied in total counts for Martha's Vineyard and the state.
- <sup>u</sup> This site also includes Quansoo, the Lewis property, and Long Point Wildlife Refuge.
- <sup>v</sup> This site includes Lucy Vincent Beach.
- <sup>w</sup> Census data for Great Point, The Galls, and Coskata-West Beach were not reported separately in 1996 or 1997. Coskata-West Beach refers to the beach along the Nantucket Sound side of Coskata, from the south end of The Galls south and west to the boundary of Coatue. This is the same area that was referenced as Coskata-North Beach by Tina Whitman in 1993 and was included as part of The Galls by Marcia Litchfield in 1991 and 1992.
- <sup>x</sup> We suspect that Great Point pair no. 2 (nest failed on May 23) subsequently renested at Coatue-North Beach. This pair is included in totals for Great Point, but not in Nantucket or statewide totals.
- <sup>y</sup> Coskata-Inner Trail refers to the inland trail running south and west from Coskata toward Coatue. Coskata-East Beach refers to the beach along the eastern (Atlantic) side of Coskata, including the washover at The Glades. Coskata Inlet is the inlet from Nantucket Harbor into Coskata Pond.

<sup>z</sup> Low Beach/Tom Nevers includes entire beach from Siasconset south and west to abandoned Navy base southwest of Tom Nevers Head.

<sup>aa</sup> We assume that 1 of 5 pairs that nested at Eel Point moved to Smith Point and renested, and 1 moved to Dionis Beach and renested. These 2 pairs are tallied only once in Nantucket and state totals.

<sup>bb</sup> In addition to a pair with 2 chicks observed on Muskeget on June 11, 4 unpaired adults were also reported on that date. As this was the only time this site was visited in 1997, the actual number of breeding pairs present was likely greater than 1.

Table 2. Summary of abundance and productivity of Piping Plovers in Massachusetts, 1985-1997.

Year	Index count <sup>a</sup>	Total count <sup>b</sup>	Mean chicks fledged/pair	Pairs with fledge data
1997	457	483	1.33	468 (97)
1996	437	454	1.35	441 (97)
1995	413	441	1.62	426 (97)
1994	329	352	1.80	334 (95)
1993	258	289	1.92	264 (91)
1992	207	213	2.03	206 (97)
1991	148	160	1.72	156 (98)
1990	111	140	1.38	125 (89)
1989	-	137	1.59	123 (90)
1988	-	134	1.29	114 (85)
1987	-	126	1.07	89 (71)
1986	-	139	-	-
1985	-	131	-	-

<sup>a</sup> Index count = total territorial pairs counted during 9-day standardized count period in late May and/or early June.

<sup>b</sup> Total count = total number of territorial pairs present during all or a portion of the breeding season.

Table 4. Reported causes of Piping Plover nest failures (n = 272) in Massachusetts, 1997.

Cause of nest failure	Number of nests		Total
	With exclosure	Without exclosure	
Overwash/flooding	40	30	70
Abandonment	43	15	58
Crow	6	40	46
Unknown predator	2	30	32
Fox	2	9	11
Gull	0	6	6
Skunk	2	5	7
Coyote	0	7	7
Rat	1	0	1
Raccoon	0	1	1
Weasel/mink	0	1	1
Eggs failed to hatch	5	0	5
Vandalism	1 <sup>a</sup>	0	1
Other	1 <sup>b</sup>	3	4
Unknown	2	20	22
Total	105	167	272

<sup>a</sup> Nest 1b at Sandy Point State Reservation, Ipswich, was vandalized by people on the night of July 4, during or after a fireworks display on the opposite shore (Castle Hill, Ipswich). The predator exclosure around the nest was destroyed and the eggs were moved.

<sup>b</sup> "Other" causes of nest failure included 1 exclosed nest and 1 unexclosed nest believed lost to predation by skunk or crow, and 2 unexclosed nests believed lost to dog or fox predation (1) and either an unknown predator or human disturbance (1).

Table 6. Comparison of Piping Plover nest success in Massachusetts, 1997, with and without predator exclosures.

Fate of nests	Number of nests (%) <sup>a</sup>	
	With exclosure	Without exclosure
Successful <sup>b</sup>	237 (78)	97 (41)
Unsuccessful	65 (22)	137 (59)
Total	302 (100)	234 (100)

<sup>a</sup> Not included in this table are 70 nests lost to flooding (40 exclosed, 30 unexclosed).

<sup>b</sup> Nests were considered successful if they hatched  $\geq 1$  egg.

Table 7. Comparison of Piping Plover hatching success in Massachusetts, 1997, with and without predator exclosures.

Fate of eggs	Number of eggs (%) <sup>a</sup>	
	With exclosure	Without exclosure
Hatched	827 (73)	322 (42)
Depredated/ failed	302 (27)	437 (58)
Total	1,129 (100)	759 (100)

<sup>a</sup> Not included in this table are 156 eggs in exclosures and 106 eggs without exclosures that were lost to high tide overwash or flooding from heavy rains.